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IN THE

Supreme Court of the United States

OCTOBER TERM, 1983

BURROUGHS CORPORATION,
Petitioner,

vs.

A. B. DICK COMPANY,
Respondent.

REPLY BRIEF FOR PETITIONER

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BURROUGHS CORPORATION,

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A. B. DICK COMPANY,

Respondent.

REPLY BRIEF FOR PETITIONER[1]

Since the filing of respondent's brief in opposition to the petition, the Court of Appeals for the Sixth Circuit has affirmed the District Court's judgment in the *Mead* case, on which petitioner has relied for collateral estoppel. *Mead Digital Systems, Inc.* v. *A. B. Dick Co.*, 521 F.Supp. 164 (S.D. Ohio 1981), *aff'd*, —— F.2d —— (6th Cir. 1983) (not yet reported). A copy of the opinion of the Court of Appeals is attached hereto as a Supplemental Appendix, designated Appendix H, starting at page A123.

In its brief, respondent asserts that the ruling in the *Mead* case on the scope of the Sweet patent in suit, to which petitioner ascribes preclusive effect, was dicta; that the *Mead* court lacked the power to adjudicate the Sweet patent's scope, except in the context of the accused machines before that court; and that the claims of a patent must be consulted to determine its scope.

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[1] All parent companies, subsidiaries and affiliates of petitioner, Burroughs Corporation, were listed on page ii of the petition. There have been no changes since the petition was filed.

In support of these assertions, respondent argues (1) that while petitioner discusses "the issue of scope", the abstract scope of a patent claim can never be anything but hypothetical; (2) that petitioner has avoided discussing the constitutional ban on hypothetical questions and advisory opinions; and (3) that it is fundamental that the claims of a patent must control the question of infringement. We will reply to these arguments in sequence.

I. Mead Judgment

Respondent's characterization of the *Mead* court's declaratory judgment defining the scope of the Sweet patent as "dicta" cannot impugn the essential nature of that ruling for collateral estoppel purposes. As discussed in the petition, the issue of scope was pleaded in the *Mead* declaratory judgment action, preserved in the final pretrial order, tried, briefed and decided by a declaration in the final judgment[2] (A 65-6, 68, 83).

The attached opinion of the Court of Appeals quotes the final judgment of the *Mead* District Court in full, including the declaration that:

> "The Sweet patent is limited in scope to oscillographic recording." (A125).

Further, the court observed that the parties to the *Mead* suit had advised the court that its decision will control the interpretation of key patents in the expanding ink jet

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[2] This is in contrast to the ruling on scope involved in *Studiengesellschaft Kohle* v. *Eastman Kodak Co.*, 616 F. 2d 1315 (5th Cir. 1980), *cert. denied*, 449 U.S. 1014 (1980), relied upon by respondent. In that case, the prior ruling on scope was at most a finding, or perhaps an incidental statement, not embodied in the final judgment. *Ziegler* v. *Phillips Petroleum Co.*, 483 F. 2d 858 (5th Cir. 1973), *cert denied*, 414 U.S. 1079 (1973). Further, the court found that it was not essential to what was embodied in the final judgment. Thus, the court correctly ruled that the finding was not entitled to preclusive effect.

printing industry. A124. With this in mind, the court affirmed the District Court's judgment. (A126, 143).

Also, with regard to the relevance of the scope holding by the *Mead* District Court to its determination of non-infringement, the opinion states that:

> "The District Court rested its determination of non-infringement largely on the grounds that the Sweet patent is limited to oscillography—the recording of waveforms of electrical signals." (A125).[3]

In summary, the *Mead* court's ruling on scope is itself a final judgment entitled to collateral estoppel effect. That ruling was pleaded, tried and finally decided, and its determination was essential to Mead's demand for a declaration of the scope of the Sweet patent—entirely apart from considerations of validity or infringement. The issue of scope was, however, also an essential element of the *Mead* court's ruling on both validity (i.e., valid "as so construed") and infringement. (A80, 125).

II. Constitutional Jurisdiction

Respondent's characterization of the scope of a patent as always being hypothetical is without the citation of authority, or reason. It is an everyday task of a patent lawyer to advise clients what they are free to do in view of a competitor's patents. If that advice is acted upon, in any substantial measure, and that action challenged by the patent-holder, it is difficult to see how any issue could be more immediate and concrete. *Cf. Super Products Corp.* v. *D P Way Corp.*, 546 F.2d 748, 752-5 (7th Cir. 1976);

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[3] The court noted the rulings of the District Court and the CAFC in this case, and disagreed with the CAFC finding that the District Court's infringement ruling in *Mead* was based solely upon the direction of the droplet deflection, rather than the cumulative differences that distinguished between oscillography and character printing. (A128-129).

Rengo Co. Ltd. v. *Molins Machine Co.*, 657 F.2d 535, 538-40 (3d Cir. 1981).[4]

Equally important to this case, however, is the fact that the *Mead* court decided its own jurisdiction, and that decision is entitled to collateral estoppel effect. (A65-81). *Underwriters Assur. Co.* v. *North Carolina Life*, 455 U.S. 691, 706 (1982); *Stoll* v. *Gottlieb*, 305 U.S. 165 (1938); *Restatement Second of Judgments*, 1982, § 12, espec. comments c. and d. Therefore, respondent's arguments based upon the hypothetical nature of the scope issue, and the consequent absence of constitutional jurisdiction, are misplaced. Respondent's avenue of review of the *Mead* court's

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[4] Respondent asserts that even after a court has defined the metes and bounds of a patent claim, it still cannot decide a case for a plaintiff or defendant until it has determined whether the specific accused device is within those metes and bounds (R. Br., pp. 7-8). It is not clear how this circumstance, where it is true, can make the scope of a patent a non-issue. Nor is it clear why a licensee or prospective manufacturer cannot seek a declaration of the scope of a patent, without including the issues of validity or infringement, where circumstances warrant, or why a determination of validity or infringement cannot be accompanied by a determination of scope that is as definitive as the facts permit, to avoid unnecessary repetitive litigation and to provide some guidance for future decisions. This is particularly true, where, as here, the patentee's representations to the Patent Office, and amendments to the claims, estop him from construing the claims to cover anything other than the declared scope. *Mead*, Conclusion 153. (A 59).

To be sure, the issue of scope, just as the issue of validity, or any other, may in a particular case lack sufficient immediacy and reality to be justiciable. *Dr. Beck & Co. G.m.b.H.* v. *General Electric Company*, 317 F.2d 538 (2d Cir. 1963); *K-Jack Engineering Co.*, v. *Pete's Newsrack, Inc.*, 205 U.S.P.Q. 696, 697 (C.D. Cal. 1978); *cf. Underwriters Assur. Co.* v. *North Carolina Life*, 455 U.S. 691, 706 (1982); *Stoll* v. *Gottlieb*, 305 U.S. 165 (1938); *and cf. Golden* v. *Zwickler*, 394 U.S. 103 (1969) (cited by respondent). These cases cannot, however, undermine a federal court's jurisdiction to determine the scope of a patent where that issue is being disputed between two competitors, and where the issue is both immediate and real.

jurisdiction determination was through an appeal in that case, and a petition to this Court. Only havoc will result from permitting a foreign court to refuse preclusive effect to a final determination by the vehicle of questioning the jurisdictional premise for the determination, when the jurisdictional ruling is itself entitled to preclusive effect.

III. Patent Claims

With regard to respondent's assertion that the claims of a patent are determinative of its scope, and controlling as to the question of infringement, while this is true, once the scope of the claims has been resolved, such as by the final judgment entered in the *Mead* case, that issue need not be relitigated.

A determination of infringement is generally a two-step process, namely, first determining the scope of the claims, and, secondly, determining whether the accused device falls within that scope. *Westinghouse* v. *Boyden Power Brake Co.*, 170 U.S. 537, 568 (1898); *Graver Tank & Mfg. Co.* v. *Linde Air Products Co.*, 339 U.S. 605, 608-09 (1950);[5] *Autogiro Company of America* v. *United States*, 384 F.2d 391, 401 (Ct. Cl. 1967), *cert. denied sub nom. United States* v. *Pitcairn*, 434 U.S. 1051 (1978). Here, as noted, the Sweet patent's scope was resolved by the declaratory judgment in the *Mead* case. The District Court in the present case correctly found that the sole remaining issue concerning infringement is whether the accused devices fall within the adjudicated scope. Also, the court correctly found, on the basis of undisputed facts, that the accused devices do not fall within that scope and, consequently, that no infringement exists.

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[5] Respondent cited one side of the coin from this Court's opinion in *Graver*, concerning literal infringement, but not the other, which followed *Westinghouse* v. *Boyden*, *supra*. *See* 339 U.S. at 608-9. This is discussed in the attached Court of Appeals opinion. (A134-137).

Conclusion

The unsettling effect of the CAFC decision in this case, both on this case and on the administration of justice in our courts, should not be permitted to stand. Certiorari should be granted for the fundamentally important issues projected by this case.

Date:

Respectfully submitted,

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SUPPLEMENTAL APPENDIX

Appendix H.

Appendix H

RECOMMENDED FOR FULL-TEXT PUBLICATION
See, Sixth Circuit Rule 24

Nos. 82-3163
82-3178

UNITED STATES COURT OF APPEALS

FOR THE SIXTH CIRCUIT

MEAD DIGITAL SYSTEMS, INC.; MEAD CORPORATION,
Plaintiff-Appellee, (82-3163)
Defendant-Appellee, (82-3178)
Cross Appellant,

v.

A.B. DICK COMPANY and GOULD, INC.,
Defendants-Appellants, (82-3163)
Plaintiffs-Appellants, (82-3178)
Cross Appellees.

ON APPEAL from the United States District Court for the Southern District of Ohio.

Decided and Filed December 8, 1983.

Before: KEITH and MERRITT, Circuit Judges; WISEMAN,* District Judge.

MERRITT, Circuit Judge. This patent infringement case concerns a new form of printing whereby printer's ink is guided

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* The Honorable Thomas A. Wiseman, Jr., Judge of the United States District Court for the Middle District of Tennessee, sitting by designation.

onto paper or other recording media by electrical charges applied to ink streaming from small nozzles, rather than by conventional type, press, pen or other contact. The process, called "ink jet printing," is now used by businesses which require high speed printing or printing on soft or other unusual surfaces. Ink jet printers are particularly well-suited for computer print-outs and labeling. The parties to this action advise us that ink jet printing may be the "wave of the future" and that our decision in the case will control the interpretation of key patents in this expanding industry.

A.B. Dick Company ("A.B. Dick"), the owner of the "Sweet" patent, U.S. Patent No. 3,966,275 issued on July 27, 1971, and the exclusive licensee under the "Lewis-Brown" patent, U.S. Patent No. 3,298,030 issued on January 10, 1967, and Gould, Inc. ("Gould"), the owner of the Lewis-Brown patent, assert that the DIJIT printer, manufactured by the Mead Corporation ("Mead"), infringes these two patents. In a well-considered opinion, District Judge Walter Rice[1] concluded *inter alia* that the Lewis-Brown patent is invalid and that the DIJIT printer does not infringe the Sweet patent.[2] *Mead Digital Systems, Inc.* v. *A.B. Dick Co.*, 521 F.Supp. 164 (S.D. Ohio 1981).

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[1] A.B. Dick and Gould originally filed a complaint alleging infringement against the Mead Corporation and Mead Data Central, Inc., in the United States District Court for the Northern District of Illinois. Shortly thereafter, Mead Digital Systems, Inc., a subsidiary of The Mead Corporation, filed a declaratory judgment action against A.B. Dick and Gould in the United States District Court for the Southern District of Ohio, Honorable Walter H. Rice, presiding. The action in Illinois was dismissed as against Mead Data Central Inc., and the remainder of the Illinois case was, with the consent of all the parties, transferred to the Southern District of Ohio where it was consolidated with the declaratory judgment action. By consent of the parties, A.B. Dick and Gould are referred to as plaintiffs and Mead as defendant.

[2] The final judgment of the District Court, filed on January 26, 1982, contained the following:

> It is Ordered, Adjudged, and Declared:
>
> 1. Mead's Dijit printer does not infringe Sweet Patent No. 3,596,275.

The District Court rested its determination of non-infringement largely on the grounds that the Sweet patent is limited to oscillography – the recording of waveforms of electrical signals. Appellants strongly contest this construction of the Sweet patent. While conceding that the illustrative embodiments of the patent depict only oscillographs, they argue that claims 1[3] and 33[4] of the Sweet patent, the claims in issue,

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2. The Sweet patent is limited in scope to oscillographic recording.

3. The Sweet patent is valid.

4. Mead's Dijit printer does not infringe Lewis-Brown Patent No. 3,298,030.

5. The Lewis-Brown patent is limited in scope to printing of characters with charged droplets that are deflected transverse to the relative movement between the paper and nozzle.

6. The Lewis-Brown patent is invalid.

7. A.B. Dick and Gould are not precluded from prosecuting the patent infringement action by reason of laches.

8. A.B. Dick and Gould shall take nothing, and the patent infringement actions by their complaint and counterclaim are dismissed on the merits.

9. The Mead Corporation and Mead Digital Systems shall recover of A.B. Dick and Gould their costs of the actions.

[3] Claim I of the Sweet patent claims:

A method of making records on a record member by use of fluid droplets, comprising the steps of supplying writing fluid to a nozzle under pressure whereby a stream of writing fluid is projected toward the record member, applying cyclically varying energy at a predetermined frequency to the writing fluid to cause the stream issuing from the nozzle to break up into a succession of separate evenly spaced unform droplets which move in free flight and initially in single file toward the record member, causing the stream adjacent to the nozzle to pass adjacent to a charging electrode, applying variable electrical signal values representative of the desired deflections to the charging electrode whereby individual droplets are electrostatically charged to effect different charges on at least some drop ets of the succession, causing the droplets thereafter to pass in proximity to a deflecting electrode, applying a potential to the deflecting electrode to produce an electrostatic deflecting field through which the droplets pass whereby charged droplets are deflected laterally, with droplets having different charges moving through different trajectories, causing relative movement between the record member and the nozzle, and causing at least some of the droplets passing through said deflecting field to be deposited on the record member to make a record thereon.

[4] Claim 33 of the Sweet patent claims:

Liquid droplet recording apparatus comprising, means for form-

disclose a method and apparatus for recording a wide variety of images, including alphanumeric characters.

In order to prevail on this issue, appellants, as we see it, must satisfactorily answer two related questions. First, if the Sweet patent contemplated calligraphy as well as oscillography and in application could compose characters as well as curved lines, why does not the patent say so directly and explain the process unambiguously? Why is this claim left unclear if it was intended? Second, if the Sweet patent claimed high speed character writing and needed no significant improvement or fundamental change to do so, why did Sweet join with Dr. Cumming, his supervisor, in subsequently filing a second, separate patent application disclosing a more advanced multiple ink jet system clearly designed for high speed character writing?

Appellants have failed to answer these questions satisfactorily and have failed to carry their burden of proof on the issues. The Mead DIJIT printer, which is based on the very patent application filed by Sweet with his supervisor after the original Sweet application was filed, is a substantial improvement over the invention disclosed in the Sweet patent.

Since we also agree with the District Court that the Lewis-Brown patent is invalid for obviousness, we affirm.

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ing a fluid jet by supplying fluid to an orifice at a pressure sufficient to cause fluid to issue from the orifice as an unsupported stream, means for providing periodic varicosities in said jet to cause it to divide at predetermined intervals into a single file succession of discrete droplets, means for establishing a droplet charging electric field at the region of said fluid jet where said drop division occurs including means for varying said electric field with time as a function of the instantaneous values of a variable signal input to charge the droplets in accordance with said instantaneous values to effect different charges on at least some droplets of the succession, means for establishing a deflecting electric field in a region traversed by said droplets for causing said drops so charged to follow trajectories that are a function of the amount of charge on said droplets, and means for collecting said droplets, said last means serving to collect droplets having different trajectories in different regions.

I. THE PATENTS IN ISSUE AND THE ACCUSED DEVICE

A. The Art Prior to Sweet

Many large and small steps of discovery in physics and electricity from the Nineteenth Century forward have led to the modern practice of ink jet printing. These steps include Michael Faraday's experiments in 1831 in electromagnetic induction and Lord Rayleigh's discovery in 1897 that a stream of liquid droplets issuing from a nozzle can be made uniform in size and spacing by applying cyclic energy or vibrations to the droplets as they form at the nozzle orifice.

C. R. Winston was the first person to incorporate these longstanding discoveries into a commercially successful ink jet printer. His device, patented in 1962 (U.S. Patent No. 3,060,429) and marketed as the Teletype Inktronic, recorded information by forming a single-file train of ink droplets that were imprinted with a uniform electrical charge. The droplets were directed between a pair of "deflection plates" which received variable electrical signals from an input source. The interaction of the constant charge placed on the droplet with the variable charge placed on the deflection plates caused the droplets to be deflected, the magnitude and direction of deflection depending on the charge placed on the deflection plates. After leaving the deflection field, the droplets travelled along their programed trajectories to a recording medium, usually paper, that passed under the nozzle and deflecting apparatus.

Although the Winston device was able to print alphanumeric characters, it could operate only at relatively slow speeds, since only one droplet could be present in the deflection field at a time. If a trailing droplet entered the deflection field before the leading droplet exited, the trailing droplet would be deflected along the identical trajectory as the leading drop-

let, since all droplets received identical charges and their trajectories were determined by the charge placed on the deflection plates when the droplets were present in the deflection field.

B. The Sweet Patent

In 1961 Richard G. Sweet, then an electrical engineer conducting research at Stanford University, received as a gift an aquarium equipped with a device that sent bubbles through the water to provide oxygen to the inhabitants of the aquarium. Sweet's scientific curiosity got the best of him, and he set out to determine how oxygen was transferred from the bubbles to the water. The pursuit of this inquiry led eventually to U.S. Patent No. 3,966,275, the Sweet patent, by all accounts a monumental step in the march toward commercial application of ink jet printing concepts.

The apparatus disclosed in Sweet's patent controlled the trajectory of the ink droplets by maintaining a constant voltage on the deflection plates and placing a variable voltage on the droplets, the opposite of the system used by Winston. Attached as Appendix A is one of the illustrative embodiments included in the Sweet patent. This arrangement permitted Sweet's device to operate much faster than Winston's; several droplets, each encoded with its own "signal" charge, could be present in the constantly-charged deflection field at the same time. Indeed, the operational speed of Sweet's device was limited only by the rate at which the droplets could be formed. Sweet found that he could generate as many as 120,000 droplets per second, resulting in a recording speed hundreds of times faster than the Winston device could achieve.

The parties have paid particular attention to the direction of deflection disclosed in the Sweet patent.[5] Claim 1 of the

[5] In a separate infringement action initiated by A.B. Dick against the Burroughs Corporation wherein A.B. Dick alleges that a machine

patent teaches that "charged droplets are deflected laterally" while claim 33 discloses an apparatus for causing charged droplets "to follow trajectories that are a function of the

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marketed by Burroughs infringes the Sweet patent, the United States District C urt for the Northern District of Illinois held that the District Court's holding in the instant case collaterally estops A.B. Dick from arguing that the Sweet patent extends beyond oscillography. *A.B. Dick Company* v. *Burroughs Corporation*, 550 F.Supp. 1065 (N.D. Ill. 1982). That decision was appealed to the United States Court of Appeals for the Federal Circuit, which held that collateral estoppel was not appropriate in that case. *A.B. Dick Company* v. *Burroughs Corporation*, 713 F.2d 700 (Fed. Cir. 1983). In reaching its decision, the Federal Circuit stated that the

> Mead court held, on the basis of claim interpretation, that the DIJIT printer did not infringe because it did not deflect droplets transversely of the relative direction of movement between the paper and the nozzle.

713 F.2d at 703.

We do not agree that the District Court below rested its holding of non-infringement solely on the different deflection directions used in the two machines. While the District Court did pay particular attention to the different deflection directions used in the Sweet device and the DIJIT printer, it also pointed to the following differences between the two machines:

> (i) each orifice in the DIJIT is incapable of producing either a continuous waveform characteristic of a variable signal or common alphanumeric or geometric configurations, 521 F.Supp. at 179;
>
> (ii) the final picture produced by the DIJIT printer is alphanumeric or graphic information which is not characteristic of the charging signals to the charging tunnels, *Id.*;
>
> (iii) the interception facility in the Sweet device does not serve the purpose of creating an apparent discontinuity in any portion of the waveform, but only to adjust the density of the waveform by increasing the distance between droplet imprints, 521 F. Supp. at 173-74.

The District Court's holding, as we read it, is based on the cumulative effect of these differences. While the court did appear to rest its decision that the DIJIT printer does not *literally* infringe the Sweet patent primarily on the difference in deflection direction, its holding that the DIJIT printer is not an equivalent of the Sweet device was, in our view, based on factors in addition to the different deflection angle used in the two machines. As we discuss *infra*, pp. 12-15, a finding of literal infringement is not determinative in infringement cases: the court must ultimately apply the doctrine of equivalents, which the District Court did. 521 F.Supp. at 184.

amount of charge on said droplets."[6] The District Court concluded that these claims are ambiguous in that the terms "laterally" and "trajectories" are meaningless without a reference plane. 521 F.Supp. at 174. The District Court resolved this perceived ambiguity by examining the illustrative embodiments, specifications, and the prosecution history of the patent and, on the basis of this examination, concluded that the claims disclose only deflection in a direction transverse to the movement of the recording medium relative to the nozzle. *Id.*

Appellants vigorously dispute this conclusion. They argue that the term "laterally" in claim 1 means "laterally to the initial droplet direction" and that the term "trajectories" in claim 33 does not address the direction of deflection.

C. The Lewis-Brown Patent

Upon hearing of Sweet's work in late 1962, Arling D. Brown and Arthur M. Lewis of Brush Instruments added a character or function generator to Sweet's droplet-printing device thereby enabling the device to print alphanumeric characters. Attached as Appendix B is one of the illustrative embodiments included in the Lewis-Brown patent. Character generators are devices which are able to "store" letters and numerals and to send to the charging electrodes voltage signals corresponding to the letters and numerals. Messages, consisting of a predetermined sequence of letters and numerals, are sent to the character generator which translates the message to a series of voltage signals and then relays the translated message to the charging electrodes which then charge the appropriate droplets to the appropriate level thereby causing the message to be printed.

The first Lewis-Brown application was filed on September

[6] See notes 3 and 4, *supra*.

25, 1964.[7] Two further applications were filed during 1965; both contained essentially the same disclosures as the initial application. After a brief prosecution, the Lewis-Brown patent issued on January 10, 1967, and A.B. Dick became the exclusive licensee under it.

After the Lewis-Brown patent issued, Sweet, whose application was pending, copied claims from the Lewis-Brown patent in order to provoke an interference proceeding between himself and Lewis and Brown. After a lengthy interference process, the Patent Office Board of Interferences resolved the question of priority of invention in favor of the Lewis-Brown patent, holding that the Sweet patent application did not disclose a character generator and therefore Sweet could not claim it in hindsight in combination with the droplet-printing apparatus which his application did disclose.[8]

D. The Sweet-Cumming Patent

In May, 1963, during the course of Sweet's work on the original Sweet device, Dr. Cumming, Sweet's supervisor, directed Sweet's attention to a recording system that used a dense array of wire styluses situated above and across a specially treated paper. Trial Transcript at 100. When electrical potential was applied to an individual stylus in the array, current passed from the stylus to the specially treated paper, which produced marks that combined to form the desired character.

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[7] In the brief prosecution of the Lewis-Brown patent application, the Patent Office examiner cited four prior-art references, including an earlier publication by Sweet describing his invention and the use of a sine-wave generator in conjunction with it. 521 F.Supp. at 176.

[8] In rendering its decision, the Board of Interferences adopted the position taken by Lewis and Brown on the limited scope of the Sweet patent application:

> Sweet's system records a cursive line representative of the voltage of an unknown, incoming waveform. A "picture" of the waveform appears on a moving strip of paper. . . . *It writes a continuous line, a cursive line,* the length depending upon the length of the incoming signal. (emphasis added)

Dr. Cumming realized that the wire styluses could be replaced with ink jets, such as those used in the original Sweet device, thereby dramatically improving the speed of the system.

After several brainstorming sessions, Sweet and Cumming proposed that Stanford's research laboratory develop this idea, but the research proposal was rejected. Undaunted, Sweet approached Honeywell with the idea, since Honeywell had helped Sweet in his initial patent application. On March 25, 1964, Honeywell, acting on behalf of Sweet and Cumming, filed a patent application that disclosed a device utilizing the multiple jet configuration. The original Sweet-Cumming application disclosed only a facsimile recorder, but an amendment was later filed that disclosed a character generator which enabled the Sweet-Cumming device to print characters. The Sweet-Cumming patent, No. 3,373,437, was issued on March 12, 1968. Attached as Appendix C is an illustration of the Sweet-Cumming invention.

The invention disclosed in the Sweet-Cumming patent is described in the patent as "an improvement over the recording system disclosed and claimed" in the Sweet patent. More specifically, the Sweet-Cumming device is described as "utilizing the principles" of the Sweet patent but being "particularly adapted for presenting a display image as distinguished from a line trace."

The record is silent as to why Sweet and Cumming elected to file an entirely separate patent application that expressly claimed the ability to print predetermined characters with ink droplets. The trial court did not expressly draw any inference from this fact, although it did note that the Sweet-Cumming patent acknowledges an indebtedness to Sweet's prior work. 521 F. Supp. at 177.

Neither Sweet nor Cumming ever actually built a machine based on the techniques and apparatus disclosed in the Sweet-Cumming patent. Shortly after the patent issued, Sweet assigned his interest to A.B. Dick while Cumming assigned his interest to Mead.

E. The DIJIT Printer

In 1967 Mead began in earnest a research and development effort which culminated in the Mead DIJIT printer, the accused device. Attached as Appendix D is an illustration of the DIJIT. While the DIJIT printer embodies virtually all of the principles and techniques disclosed in the Sweet-Cumming patent, Mead's research was independent of the research conducted by Sweet and Cumming.[9] Shortly after the Sweet-Cumming patent issued, Mead purchased Cumming's interest: the DIJIT can thus be thought of as an application of the Sweet-Cumming patent.[10]

The DIJIT printer contains a row of orifices situated above and across the recording medium so that the recording medium travels underneath the orifice array in a direction perpendicular to the array. A continuous stream or jet of ink issues from each orifice simultaneously and each jet is broken into evenly sized and spaced droplets by a process similar to that used in the Sweet and Lewis-Brown devices. Unlike the other devices, though, all of the droplets that print in the DIJIT are essentially undeflected: images are formed by deflecting into a collector or interceptor selected droplets from selected orifices and permitting the remaining droplets to fall undeflected onto the recording medium. Droplet interception is controlled by a computer which can be programmed to send instructions appropriate for printing alphanumeric characters as well as facsimile reproductions of video signals.

The process by which droplets are deflected in the DIJIT is similar to that used in the Sweet and Lewis-Brown devices: each droplet passes near a charging electrode and then through

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[9] The appearance of the Sweet-Cumming patent in 1968 created a state of shock in the Mead engineers; their reaction was "how can two organizations or two people completely independently in the same, almost precise time frame be pursuing the same area of investigation." Trial Transcript at 667.

[10] Appellants concede that the DIJIT printer is an application of the Sweet-Cumming patent. Appellants' Brief at 21.

a deflection field. The interaction of the charge placed on the droplet with the electrostatic field causes the droplet to change its course.

However, since the sole purpose of deflection in the DIJIT is to prevent selected droplets from reaching the recording medium, all deflected droplets receive a virtually identical charge. Thus, only two charge levels are necessary in the DIJIT: one charge level (one hundred volts) deflects the droplets to the catcher while the other charge level (zero volts) permits the droplets to travel undeflected to the recording medium. Deflection is used in the Sweet and Lewis-Brown devices to direct droplets to various locations on the recording medium as well as to direct droplets to a collector. To accomplish this result, multiple charge levels are used in those devices.

Moreover, deflection in the DIJIT is longitudinal with respect to the movement of the recording medium, that is, the ink droplets are deflected in the same direction that the recording medium travels. Longitudinal deflection is used since all deflected droplets are intended to be intercepted and the interceptor or collector is situated across the recording medium, parallel to the orifice array. As noted earlier, the District Court concluded that the Sweet device discloses only transverse deflection.

II. MEAD'S INFRINGEMENT OF THE SWEET PATENT

A. Applicable Legal Principles

The infringement issue in this case turns on the application of the "doctrine of equivalents," a canon of patent construction sometimes used in infringement cases to determine the scope of patent claims. This doctrine holds that a device is in infringement even if it does not "literally" infringe the patent "if it performs substantially the same function in substantially

the same way to obtain the same result." *Sanitary Refrigerator Co.* v. *Winters*, 280 U.S. 30, 42 (1929). However, as Justice Jackson noted in *Graver Mfg. Co.* v. *Linde Co.*, 339 U.S. 605, 608-609 (1950), the doctrine of equivalents is a two-edged sword: "where a device is so far changed in principle from a patented article that it performs the same or similar function in a substantially different way, but nevertheless falls within the literal words of the claim, the doctrine of equivalents may be used to restrict the claim and defeat the patentee's action for infringement." The doctrine thus may be applied in favor of as well as against a patentee. It can be used to hold a device in infringement even though the device does not literally infringe the patent claims; it can be used to hold a device not in infringement even though the device falls within the literal words of the claim.

The general purpose of the doctrine is to encourage patentable inventions as well as genuine improvements of existing inventions but to discourage what Justice Jackson in *Graver* calls "unimportant and insubstantial changes and substitutions in the patent which, though adding nothing, would be enough to take the copied matter outside the claim, and hence outside the reach of the law" in the absence of a flexible doctrine designed to protect the patentee from insubstantial changes. 339 U.S. at 607.

The doctrine "is not the prisoner of a formula," and "a finding of equivalents is a determination of fact. . . . It is to be decided by the trial court and that court's decision, under general principles of appellate review, should not be disturbed unless clearly erroneous." 339 U.S. at 609-10. Judge Hand referred to the doctrine as "in misericordiam to relieve those who have failed to express their complete meaning" in the patent and stated that its application in "each case is inevitably a matter of degree." *Claude Neon Lights, Inc.* v. *E. Machlett's Sons*, 36 F.2d 574, 576 (2d Cir. 1929). Many courts have said that a patent should be accorded a wider

range of equivalents if it represents a major step in the field such that it may be called a "pioneer patent." *See, e.g., Boyden Power-Brake Co.* v. *Westinghouse*, 170 U.S. 537, 569 (1898); *Acme Highway Product Corp.* v. *D.S. Brown Co.*, 473 F.2d 849 (6th Cir. 1973).

Appellants direct us to the following passage in *Graver* as controlling: "If accused matter falls clearly within the claim, infringement is made out and that is the end of it." 339 U.S. at 607. This so-called doctrine of "literal infringement" continues to live in the cases despite repeated pronouncements that infringement is not a mere matter of words. *See* CHISUM, *Patents* § 18.04[4] (1983) and cases cited therein. Indeed, in *Graver* the Supreme Court indicates that the doctrine of literal infringement is not to be taken literally: two paragraphs after announcing that doctrine the Court recognizes that the doctrine of equivalents applies even when the accused device "falls within the literal words of the claim." 339 U.S. at 608-09.

Courts, however unfortunately, continue to pay lip service to the doctrine of literal infringement as though it were the rule in *Shelley's Case*. Perhaps we are embarrassed to expose the "wholesale realism" which controls many infringement cases, *see* 339 U.S. at 608, and we choose instead to present the facade of precision and certainty which attends the doctrine of literal infringement.

As Judge Hand pointed out in *Claude Neon Lights*, there is no doubt that the doctrine of equivalents "violates in theory the underlying and necessary principle that the disclosure is open to the public save as the claim forbids, and that it is the claim and that alone which measures the monopoly." 36 F.2d at 575 (citations omitted). As Hand stated, the doctrine is an "anamoly" needed to soften and render flexible the rule of literal infringement.

The "wholesale realism" of the doctrine of equivalents means that precedents have "little or no value" since a decision is "bound to have an arbitrary color, as in all close cases

of interpretation, and it is difficult to give it greater authority than an appeal to the sympathetic understanding of an impartial reader." *Claude Neon Lights*, 36 F.2d at 576. This result will not set well with those who demand rules in this area and treat patent law problems as questions of semantics. Settled expectations are an important goal, but the survival of the doctrine of equivalents in this specialized field demonstrates that "unsparing logic" must be tempered with "wholesale realism." *See Royal Typewriter Co.* v. *Remington Rand, Inc.*, 168 F.2d 691, 692 (2d Cir. 1948).

With these general legal principles in mind, we now turn to the arguments advanced by appellants to support their assertion that the DIJIT printer infringes the Sweet patent.

B. Appellants' Infringement Arguments

Appellant's principal argument is that the District Court improperly circumscribed the Sweet patent by its illustrative embodiments: a patent is measured, appellants argue, by its claims and not its specifications or embodiments. Claims 1 and 33 of the Sweet patent, properly understood, extend far beyond oscillography, presumably to all ink jet printers that use the Sweet technique of selectively charging ink droplets. They argue that Sweet's invention consists of five elements – an ink jet generator, an ink jet stimulator, a droplet-charging mechanism, a deflecting mechanism, and a droplet-collection mechanism – and that the DIJIT printer contains and uses all five of these elements "in precisely the manner specified" in the Sweet patent. Appellant's Brief at 46. Appellants conclude therefore that the Sweet claims "read on" the DIJIT printer and that infringement follows as a matter of law.

Appellants are wrong on two counts. First, a finding of literal infringement is not the end of an infringement inquiry, despite numerous judicial statements to the contrary.[11] As

[11] *See* p. 14, *supra*.

this Court stated in *National Rolled Thread Die Co.* v. *E. W. Ferry Screw Products, Inc.*, 541 F.2d 593, 600 (6th Cir. 1976):

> Infringement should not be determined by a mere decision that the terms of a claim of a valid patent are applicable to the defendant's device. Two things are not necessarily similar in a practical sense because the same words are applicable to each. . . .
>
> There is no magic in a name, nor in a claim; that the words preferred by a patentee to define his invention apply literally to another's device suggests, but does not prove, infringement; there must be a substantial identity, to justify that conclusion of law.
>
> (citations omitted).

Put differently, the doctrine of literal infringement is informed by the doctrine of equivalents: in infringement actions the court must consider the substance of the invention along with the form of the claims. Thus, even were we to determine that the DIJIT printer "reads on" claims 1 and 33 of the Sweet patent,[12] we would still be required to consider whether those claims should be restricted by the doctrine of equivalents.

When we make this inquiry, we see that appellants mischaracterize the relation between the DIJIT printer and the Sweet patent: The DIJIT printer does not use the elements disclosed in the Sweet patent in "precisely the manner" specified in the patent. Rather, the DIJIT printer – to use the time-worn and conclusory formulation of the doctrine of equivalents – uses the elements disclosed in the Sweet patent in a substantially different way to achieve a substantially different result.

The Sweet patent does not contemplate a high speed character printer with coordinated multiple jets and a deflection system whereby all charged droplets are deflected into a col-

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[12] Since we determine that the DIJIT printer is not the equivalent of the invention disclosed in the Sweet patent, we need not consider whether it is in literal infringement.

lector and uncharged droplets are deposited on the recording medium to form the desired characters. The DIJIT printer, quite simply, is a more sophisticated device, embodying inventive insights not part of the Sweet patent. While it does rely on Sweet's fundamental concept of ink jet charging and deflection, it also incorporates those concepts of the Sweet-Cumming patent which Sweet himself described in that later patent as improvements over his original device. Those concepts include the coordination of multiple jets, interception for creating an apparent discontinuity in the image, and a charging and deflection system whereby the final picture is not characteristic of the charging signals.

The District Court thus correctly concluded that the Sweet claims must be restricted so as not to "read on" the DIJIT printer. This interpretation of the claims results from the application of the doctrine of equivalents, not from a mistaken reliance on the illustrative embodiments of the patent, as appellants believe.

In reaching this conclusion, we are heavily influenced by the fact that after his initial research, Sweet joined with Cumming to file and obtain a second patent disclosing, in essence, the Mead DIJIT printer. The fact that Sweet filed for a new patent with Cumming represents a contemporaneous implied admission that the Sweet-Cumming complex system of charging an array of jets and using uncharged droplets for writing constitutes a significant advance on Sweet's original work. This is the only reasonable explanation for Sweet's conduct. Appellants cannot deny that a pioneer in the field – Sweet himself – clearly appears to have believed in the early 1960s that the Sweet-Cumming patent – and thus the DIJIT printer – was a significant advance and should be independently patented. Actions sometimes testify more truly about a man's purpose than his words. We are more persuaded by Sweet's conduct at invention time than by his testimony at trial when his interests may have changed because of the way he had sold his patent rights.

Although the Sweet-Cumming patent may not represent the basic advance, the quantum leap in insight, represented by the Sweet patent, it is a useful improvement not self-evident from Sweet's first discovery. Sweet should not be relieved of his failure to express this separate advance in his original patent by Judge Hand's "misericordiam." The two insights, separately patented, should not be conflated into one, although the first was the more pioneering effort.

III. THE VALIDITY OF THE LEWIS-BROWN PATENT

The District Court held the Lewis-Brown patent invalid under 35 U.S.C. § 103[13] on the grounds that in light of the prior art the subject matter of the patent taken as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was conceived. 521 F. Supp. at 185. Appellants argue that in reaching this conclusion the District Court disregarded the presumption created by 35 U.S.C. § 282[14] that a patent is valid over the prior art considered by the Patent Office. Since the District Court considered the same prior art as did the Patent Office, appellants

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[13] 35 U.S.C. § 103 provides that

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

[14] 35 U.S.C. § 282 provides in pertinent part that:

> A patent shall be presumed valid. Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim. The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity.

argue that the District Court was bound by the Patent Office's determination of validity.

Appellants misapprehend the nature of the presumption created by 35 U.S.C. § 282.[15] As this Court noted in *Universal Electric Co.* v. *A.O. Smith Corp.*, 643 F.2d 1240, 1245 (6th Cir. 1981), the presumption merely places the burden of proof of invalidity on the party raising the issue and it has no independent evidentiary value. It does not prevent a court "save in cases of clearest error" from invalidating a patent on the prior art the Patent Office considered, as appellants would have us hold.

In *Graham* v. *John Deer Co.*, 383 U.S. 1, 17 (1966), the Supreme Court established the factual inquiries that must be made when obviousness is alleged: "the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved." Once these factual determinations are made, the court must then decide as a matter of law whether the subject matter of the patent in issue is obvious. The findings of the District Court on the factual issues are subject to the clearly erroneous standard. *Universal Electric*, 643 F.2d at 1247 and cases cited therein.

Regarding the scope and content of the prior art, the District Court found that the use of character generators in connection with ink drop printing was known in the art prior to Lewis' and Brown's work: the Winston patent discloses a character generator of sorts and Sweet used a sine-wave generator, a kind of function generator, with his machine. 521 F. Supp. at 183.

Regarding the differences between the prior art and the claims at issue, the District Court found that the Lewis-Brown

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[15] We note that if appellants' view of this statute controlled, their infringement argument as to the Sweet patent falls, since the DIJIT printer is based on the Sweet-Cumming patent, which the Patent Office validated over the Sweet patent.

patent discloses, in essence, a function generator like that used in the Winston device attached to an ink droplet charging apparatus like that used in the Sweet device. 521 F. Supp. at 176.

Regarding the level of ordinary skill in the pertinent art at the time of Lewis' and Brown's work, the District Court found that artisans in the field of ink jet printing were familiar with the use of character generators. 521 F. Supp. at 183. The court also cited the short time that passed between Sweet's invention and the Lewis-Brown invention as evidence that the use of a character generator with the Sweet device would have been obvious to a person of ordinary skill in the art. *Id.*

Based on our review of the record, we cannot say that any of these findings are erroneous. A consideration of these findings leads to but one conclusion: attaching a character generator to the Sweet device — which appellants concede is the Lewis-Brown "invention", Appellant's Brief at 19, — would have been obvious to a person of ordinary skill in the art at the time of Lewis' and Brown's work.

Since we agree with the District Court that the Lewis-Brown patent is invalid for obviousness, we need not consider the District Court's conclusion that the DIJIT printer does not infringe this patent.[14] *Universal Electric*, 643 F.2d at 1241.

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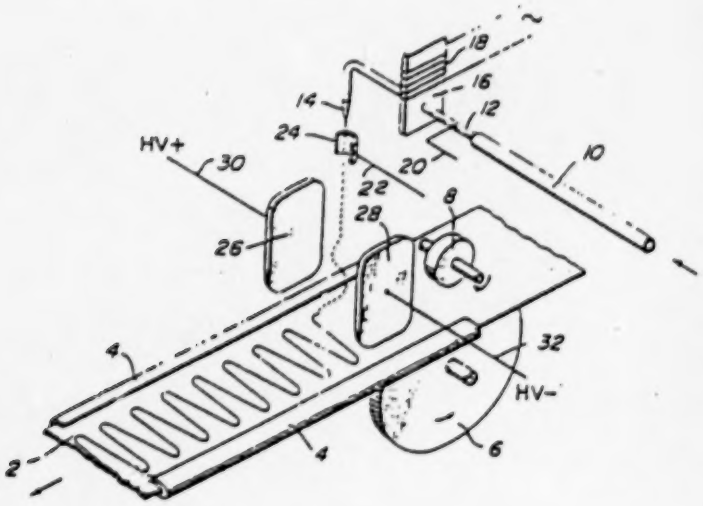
[14] The District Court also held the Lewis-Brown patent invalid under 35 U.S.C. § 102(f) to the extent that it claims invention of the use of a sine-wave generator in connection with the operation of Sweet's invention because Sweet, not Lewis and Brown, invented the subject matter so described. 521 F. Supp. at 185. 35 U.S.C. § 102(f) provides that a person shall be entitled to a patent unless "he did not himself invent the subject matter sought to be patented." While we need not review this determination given our decision that the patent in its entirety is invalid, we note that the District Court's decision on this issue was clearly correct.

Appellants characterize claim 2 of the Lewis-Brown patent as "explicitly drawn to a character printer." Appellants' Brief at 49. However, the patent defines the word "character" to include waveforms. 521 F. Supp. at 176. Claim 2 thus discloses in part an apparatus

Accordingly, the judgment of the District Court is affirmed.

"responsive to input signals characteristic of predetermined [waveforms] for printing said predetermined [waveforms] on a recording medium;" in other words, an ink jet oscillograph. To the extent that claim 2 discloses an ink jet oscillograph, it is clearly invalid under § 102(f), since no one disputes that Sweet first invented such an apparatus.

APPENDIX "A"

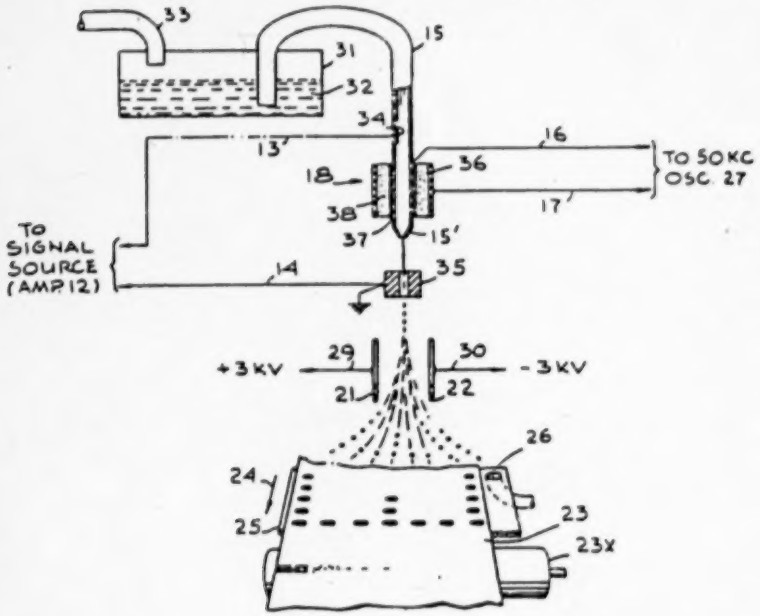


Nos. 82-3163, -3178 *Mead Corp., et al.* v. *A.B. Dick, et al.* 23

APPENDIX "B"

Jan. 10, 1967 A. M. LEWIS ET AL 3,298,030

ELECTRICALLY OPERATED CHARACTER PRINTER

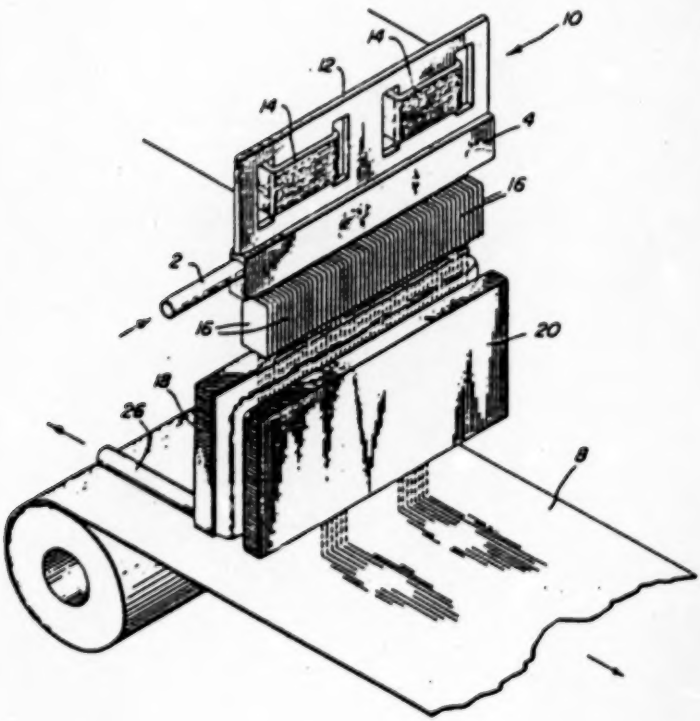


24 *Mead Corp., et al.* v. *A.B. Dick, et al.* Nos. 82-3163, -3178

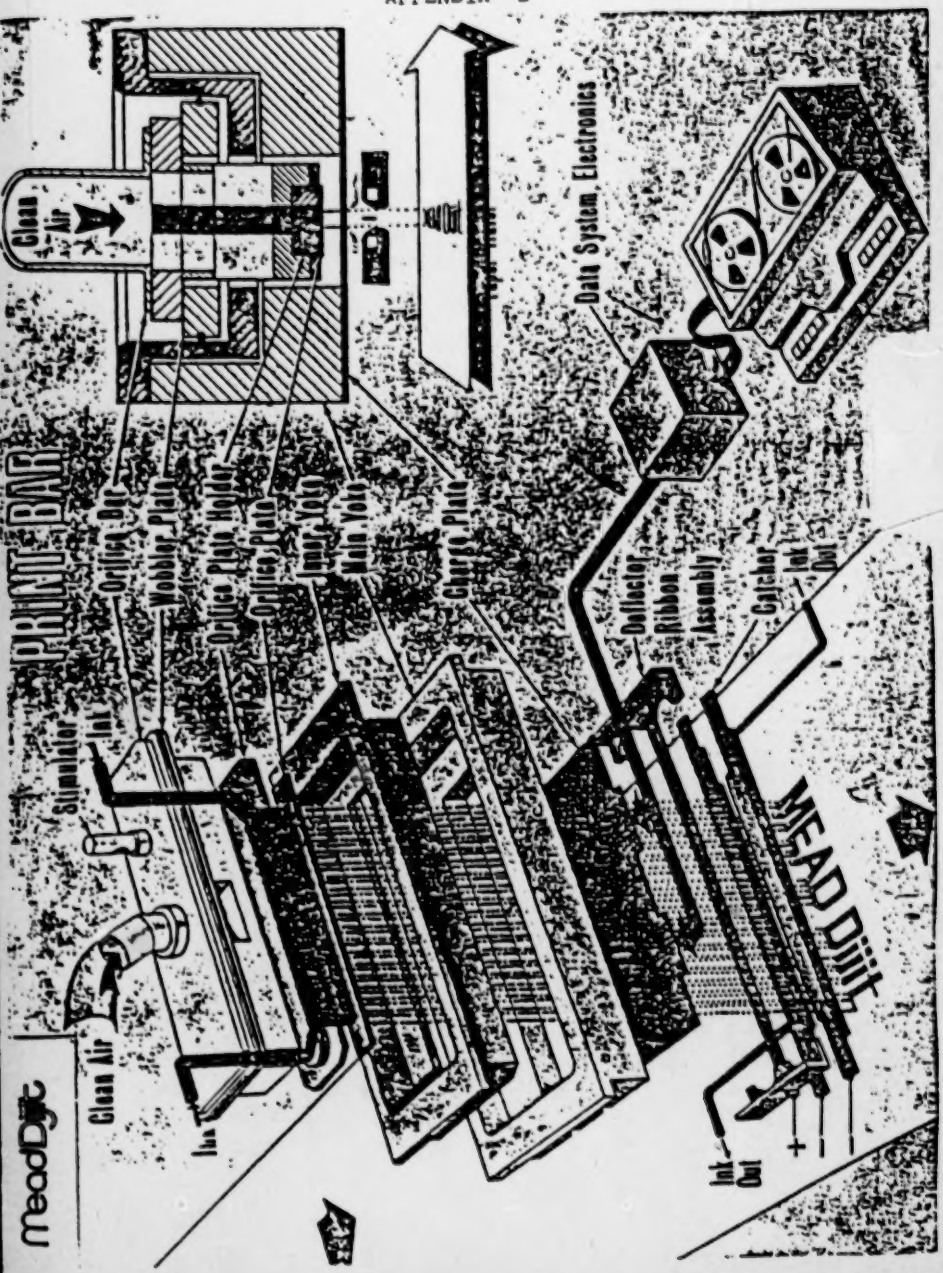
APPENDIX "C"

March 12, 1968 R. G. SWEET ET AL 3,373,437

FLUID DROPLET RECORDER WITH A PLURALITY OF JETS



APPENDIX "D"


Clean Air
Ink Out
Data System Electronics
PRINT BAR
Stimulator
Ink
Orifice Bar
Wobbler Plate
Orifice Plate Holder
Orifice Plate
Ink
Clean Air
Ink
Main Yoke
Charge Plate
Deflector
Ribbon
Assembly
Catcher
Ink Out
MEAD Digit
Ink Out
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MeadDigit